

# SEQUENCE LISTING

<110> Franco, Christopher Milton Mathew  
Coombs, Justin Taylor

<120> A method and agents for improving plant productivity involving  
endophytic actinomycetes and metabolites thereof

<130> 19460

<140> 10/563,637

<141> 2006-01-06

<160> 33

<170> PatentIn version 3.1

<210> 1

<211> 1158

<212> DNA

<213> actinomycete

<220>

<221> misc\_feature

<222> (1)..(1155)

<223> "n" is unknown nucleotide

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tcgcggccta tcaccttgtt ggtgggggta tggcctacca aggcgacgaa cggtagcccg	240
cctgagaggg cgaccggcca cactgggact gagacaccgc ccgaactcct acgggaggca	300
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cggccttngg gttgtaaacc tntttcagca gggacgaagt tgacgtgtac ctgtagaaga	420
agcgccggct aaatangtc cagcagccgc ggtaatangt agggcgcgag cgttntccgg	480
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gtagctaacy cattaagcgc cccgcctggg gactacggcc gcaaggctaa aactcaaagg	840
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gcaacgancg caacccttgg ttccatgttg ccagcacncc ctttgnggtg gtggggacnc	1080
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ccttatgttc ttgnngtg	1158

<210> 2

<211> 1437

<212> DNA

<213> actinomycete

<220>

<221> misc\_feature

<222> (1)..(1437)

<223> "n" is unknown nucleotide

<400> 2

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ggggtctaat accggataac actnctgctc tcatgggcag gggttaaaag ctccggcggt	180
gaaggatgag cccgcggcct atcagcttgt tggtagagta atggctcacc aaggcgacga	240
cggttagccg gcctgagagg gcgaccggcc aactgggac tgagacacgg ccagactcc	300
tacgggaggc agcagtgggg aatattgcaa caatgggcga aagcctgatg cagcgacgcc	360
gcgtgagggg tgacggcctt cgggttgtaa acctctttca gcagggaaga agcgaaagtg	420

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<210> 3

<211> 317

<212> DNA

<213> actinomycete

<220>

<221> misc\_feature

<222> (1)..(311)

<223> "n" is unknown nucleotide

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actcgggggt	aagccccnag	ctttcacatc	cgacgtgaca	agccgcctac	aanctcttta	180
cgcccaataa	ttccgganaa	cgctcgcacc	ctacntntta	ccgcggctgc	tggcncgtnt	240

ttagccggtg cttcttctgc aggtaccgtc actttcgctt cttccctgct naaaaagggt	300
tacaacccta nggccgt	317

<210> 4

<211> 1048

<212> DNA

<213> actinomycete

<220>

<221> misc\_feature

<222> (1)..(1043)

<223> "n" is unknown nucleotide

<400> 4

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gcaatcgttg tccggaatta ntgggcgtaa agagntcgta ggcggcttat cacgtcgggt	180
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caggattaga taccctggta gtccacgccg taaacgggtg gaactaggtg ttggcgacat	420
tccacgtcgt cggtgccgca gctaacgcgt taagttcccc gcctggggag tacggccgca	480
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tcgacgcaac gcgaagaacc ttaccaaggc ttgacataca ccggaagca tcagagatgg	600
tgccccctt gtggtcgggtg tacaggtggt gcatggctgt cgtcagctcg tgtcgtgaga	660
tgttgggtta agtcccgcaa cgagcgcaac ccttggttct gtgttgccag catgcccttc	720
ggggtgatgg ggactcacag gagaacgccg gggtaactc ggaggaagggt ggggacgacg	780
tcaagtcatt atgcccccta tgtcttgggc tgcacacgtg ctacaatggc aggtaaatga	840
gctgcgatac cgtgaggtgg agcgaatctc aaaaaagcct gtctcanttc ggattgggggt	900
ctgnaantcg accccatgaa agtcggagtt gctaattatc ccagatcaac attgctggcg	960
gtgaatacgt tcccggggcc ttggtaaaca ccgcccgtca angtnaagaa agtcgggtaa	1020
cacccgaaan ccggtgggcc aancctct	1048

<210> 5  
 <211> 508  
 <212> DNA  
 <213> actinomycete

<220>  
 <221> misc\_feature  
 <222> (1)..(472)  
 <223> "n" is unknown nucleotide

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 cccgggcttt cacacccgac ntgacaagcc gcctacaaac tctttacgcc caataattcc 180  
 ggacaacgct tgcgccctac ntattaccgc ggctgctggc acntatttag ccggcgcttc 240  
 ttctgcaggt accgtcactt tcgcttcttc cctgctgaaa aagggtttaca acccgaaggc 300  
 cgctcatcct caccgpgcgt cgctgcatca ggctttcgcc cattgtgcaa tattccccac 360  
 tgctgcctcc cntaggaatc tgggcccgtgt ctcaatccag tgtggccggt cccctctcng 420  
 gccggctacc gtcttcctt ggtnaccatt anctcaccaa caactgatag gncgcgggct 480  
 catcttcacg cgggaacttt caaccacc 508

<210> 6  
 <211> 1420  
 <212> DNA  
 <213> actinomycete

<400> 6  
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 gtctaatacc ggatacgatt cgggagggcat ctcttggtac tggaaagctc cggcggtgaa 180  
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caacgcgaag aaccttacca aggcttgaca tataccggaa agcgccagag atggtgcccc	960
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tcgaccccat gaagtcggag ttgctagtaa tcgcagatca gcattgctgc ggtgaatacg	1320
ttcccgggcc ttgtacacac cgcccgtcac gtcacgaaag tcggtaacac ccgaagccgg	1380
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<210> 7

<211> 1239

<212> DNA

<213> actinomycete

<220>

<221> misc\_feature

<222> (1)..(1217)

<223> "n" is unknown nucleotide

<400> 7

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ttgcacaang ggcgaaagcc tgatgcagng angccgcgtg agggaagacg gcctttgggt	180
tgtaaacctn tttnagcagg gaagaagcga aagtgcgggt acctgcagaa gaagcgccgg	240

ctaantangt gccagcagcc gcggttaatan gtagggcgca agcgttgtcc ggaattattg	300
ggcgtaaaga gcttgttaggc ggcttgtcan gtnggatgtg aaagcccggg gcttaacccc	360
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agcggtgaaa tgcgcagata tcaggaggaa caccggtggc gaaggcggat ctctgggcca	480
ttactgacgc tgaggagcga aagcgtgggg agcgaacagg attagatacc ctggtagtcc	540
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acgcattaag ttccccgcct ggggagtagc gccgcaaggc taaaactcaa aggaattgac	660
gggggcccgc acaagcagcg gagcatgtgg ctttaattcga cgcaacgcga agaacccttac	720
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tggggctgca cacgtgctac aatggccggt acaatgagct gcgatgccgc gaggcggagc	1020
gaatctcaaa aagccggtct cagttcggat tgggggtctg naactcgacc ccatgaantc	1080
ggagttgcta ataatcccaa attcancatt ggtgcggtga atacttcccg ggcctggtac	1140
acnaccgccc gtcaactcac gaaagtcggt naaacccgaa accggtgggc caacccttg	1200
tgggaaggaa ctggccnaag tgggactggc gattgggac	1239

<210> 8

<211> 431

<212> DNA

<213> actinomycete

<220>

<221> misc\_feature

<222> (1)..(424)

<223> "n" is unknown nucleotide

<400> 8

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cgggctttca catccnacgt gacaagccgc ctacaanctc tttagcggca ataattccgg	180
acaacgcttg cgccctacnt attaccgagg ctgctggcac ntatttagcc ggcgcttctt	240

ctgcaggtac cgtcactttc gctncttccc tgctgaaana ggttttacaac ccaaagggcn	300
tcatccctcn ccggcntcnt tgcntcnggc ttncncccat tgttcaannt tccccactgc	360
tnctccctc cggaatctgg gccgntgtct cattcccntt ntggccggtc cccctcncag	420
gccngctacc c	431

<210> 9

<211> 653

<212> DNA

<213> actinomycete

<220>

<221> misc\_feature

<222> (1)..(640)

<223> "n" is unknown nucleotide

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tccatgcggg anaaattgtt ntccggtatt aaacccggt tccagggnnt gtcccaaat	600
tgaagggggg attgnccact ttttactcac ccggttcncn ctaatccacc acc	653

<210> 10

<211> 1444

<212> DNA

<213> actinomycete



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<210> 11

<211> 503

<212> DNA

<213> actinomycete

<220>

<221> misc\_feature

<222> (1)..(499)

<223> "n" is unknown nucleotide

<400> 11

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ccnatctccc ctaccgaact ctancctgcc cgtatcnact gcaaaccggt ggtaagccc	120
cgggctttca caaccgacnt gacaagccgc ctacaanctc ttacnccca ataattccgg	180
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ccggnatccc gtcgtccctt ggtgaaccnc tacctcncca acaanctgat agggcgcggt	480
ctcancntgc acgccgganc ttt	503

<210> 12

<211> 1173

<212> DNA

<213> actinomycete

<220>

<221> misc\_feature

<222> (1)..(1144)

<223> "n" is unknown nucleotide

<400> 12

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agtaanangt gggcaatttg cccttcattt tggacaagcc ctggaaacgg gtttaatacc	120
ggataacatt ttntcccgca tgggaggggg ttgaaagntc cggcggtgaa ggatgagccc	180
gcggcctatn agcttggttg tggggtaatg gcctacccaa gggagacggg tagccggcct	240
gagagggcga ccggccacac tgggaatgag anacggccca gaatcctacg ggaggcagca	300
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gccttngggg tgtaaaccct tttnagcagg gaagaagcga aagtgcagg acctgcagaa	420
gaagcgccgg ctaaataagt gccagcagcc gcggtaataa gtagggcgca agcgttgtcc	480

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agaaccttac caaggcttga catataccgg aaagcatcag agatggtgcc ccccttgtgg	960
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<210> 13

<211> 1404

<212> DNA

<213> actinomycete

<220>

<221> misc\_feature

<222> (1)..(493)

<223> "n" is unknown nucleotide

<400> 13

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gaganacggc ccagaatcct acgggaggca gcagtgggga atattgcaca atgggagaaa	300
gcctgatgca gcgacgccgc gtgagggatg acggccttcg ggttgtaaac ctttttcagc	360
agggagaag cgaaagtac ggtacctgca gaagaagcgc cggctaaata ngtgccagca	420
gccgcggtaa tangtagggc gcaagcgttg tccggaatta ttgggcgtaa agagnttgta	480
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gggctagcta	gagtgtggtg	ggggagatcg	gaattcctgg	tgtagcggtg	aaatgcgcag	600
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cacgtcacga	aagtcggtaa	caccgaagc	cggtggtcca	accccttggtg	ggagggagct	1380
gtcgaagggtg	ggactggcga	ttgg				1404

<210> 14

<211> 1411

<212> DNA

<213> actinomycete

<220>

<221> misc\_feature

<222> (1)..(1411)

<223> "n" is unknown nucleotide

<400> 14

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taacacgtgg	ccaantgtgn	ccgtcactat	gggacgaaga	ccttggaac	ggggctaat	120
accggataac	actctgtccc	gcatgggacg	gggttgaaag	ctccggcggt	gaaggatgag	180
cccgcggcct	atcagcttgt	tggtggggta	atggcctacc	aaggcgacga	cgggtagccg	240
gcctgagagg	gcgaccggcc	acactgggac	tgagacacgg	cccagactcc	tacgggaggc	300
agcagtgggg	aatattgcac	aatgggcgaa	agcctgatgc	agcgacgccg	cgtgagggat	360

gacggccttc	gggttgtaaa	cctctttcag	caggggaagaa	gcgaaagtga	cggtacctgc	420
agaagaagcg	ccggctaact	acgtgccagc	agccgcggta	atacgtaggg	cgcaagcggt	480
gtccggaatt	attgggcgta	aagagctcgt	aggcggcttg	tcacgtcgga	tgtgaaagcc	540
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cgcaagaac	cttaccaagg	cttgacatat	accggaaagc	atcagagatg	gtgccccct	960
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gaccccatga	agtcgacttt	gctagtactc	gcacgtcaac	attgctgcgc	tgaatacgtc	1320
cccgggcctt	gtacacaccg	cccgtcacgt	cacgaaagtc	ggtaacaccc	gaagccgggtg	1380
gnccaacccc	ttgtgggagg	gagctgtcga	a			1411

<210> 15

<211> 562

<212> DNA

<213> actinomycete

<220>

<221> misc\_feature

<222> (1)..(547)

<223> "n" is unknown nucleotide

<400> 15

ccgccttcgc	caccggtggt	cctcctgata	tctgcgcatt	tcaccgctac	accaggaatt	60
ccnatctccc	ctaccacact	ctagctancc	cgtatcnaat	gcaaaccg	ggtaacccc	120
cgggctttca	cacccnacnt	nacaanccgc	ctacaaactc	tttacgccca	ataattccgg	180

acaacgcttg cgcctactt attaccgcgg ctgctggcac ttatttagcc ggcgcttctt	240
ctgcaggtac cgtcactttc gcttcttccc tgctgaaaaa ggtttacaac ccgaaggcng	300
tcatccctca cgcggcntcg ctgcatcagg ctttcgcca ttgtgcaata ttccccactg	360
ctgcctcccg tagnantctg ggccgtntct cantcccagt gtggnccggtc gccctctcag	420
gccggctacc cgtcgtcncc tnggtnaacc attanntcac caacaagctg ataggccgcg	480
ggctcatcct tcaccgccgg agcttttaac ccctgcccat gaaaacagan gtnttatccg	540
gtattanaac ccgtttccag gg	562

<210> 16

<211> 1390

<212> DNA

<213> actinomycete

<220>

<221> misc\_feature

<222> (1)..(1362)

<223> "n" is unknown nucleotide

<400> 16

atgcaagtcg agcggaaagg cccttcgggg tactcgagcg gcgaacgggt gagtaacacg	60
tgagttaatc tgccccaggc tctggatacc caccgaaaa cggtgattaa taccgaatac	120
gacaaccgat ttgcatgac tggtggtgna aagtttttcg gcctgggatg tgcttcgcgg	180
cctatcagct tgttggtgag gtaatggctc acccaaggct tcgacggtag ccggcctgag	240
agggtgaccg nccacactgg gactgagaca cggcccagac tcctacggga ggcagcagtg	300
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ggaccggcca actacgtgcc agcagccgcg gtaatacgta ggggccgagc gttgtccgga	480
attattgggc gtaaagggtc cgtaggcggt ctgtcgcgtc gggagtgaaa accagggtgct	540
taacacctgg cctgctttcg atacgggcag nctagaggta cncaggggag aatggaattc	600
ctggtgtagc ggtgaaatgc gcagatatca ggaggaaaca ccggtggcga agncggttct	660
ctgggagtat cctgacgtg aggagcgaaa gtgtggggag cgaacaggat tagataccct	720
ggtagtcac accgtaaacg ttgggcgcta ggtgtgggac acattccacg tgttccgtgc	780
cgcagctaac gcattaancg ccccgctgg ggagtacggc cgcaangcta aaactcanag	840

gaattgacgg	gggcccgcac	aagcggcgga	gcatgcggat	taattcgatg	caacgcgaag	900
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tgtacaggtg	gtgcatggct	gtcgtcagct	cgctgtcgtg	agatgttcgg	gttaagtccc	1020
gcaacgagcg	caaccctcgt	cctatgttgc	cagcaattcg	gttggggact	cataggagac	1080
tgccggggtc	aactcggagg	aaggtgggga	tgacgtcaag	tcatcatgcc	ccttatgtcc	1140
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aatcccaaaa	agccggtctc	agttcggatt	gggggtctgca	actcgacccc	atgaagtcgg	1260
agtcgctagt	aatcgagat	cagcaacgct	gcggtgaata	cgttcccggg	ccttgtagac	1320
accgccgctc	acgtcacgaa	agtcggcaac	acccgaagcc	antggcccaa	ctcgtaagag	1380
agggagctgt						1390

<210> 17

<211> 1411

<212> DNA

<213> actinomycete

<220>

<221> misc\_feature

<222> (1)..(638)

<223> "n" is unknown nucleotide

<400> 17

gtgcttaaca	catgcaagtc	gaacgatgaa	gccgcttcgg	tggtggatta	gtggcgaacg	60
ggtgagtaac	acgtgggcaa	tctgcccttc	actctgggac	aagccctgga	aacgggggtct	120
aataccggat	aacactctgt	cccgcattgg	acgggggttg	aagctccggc	ggtgaaggat	180
gagcccgcgg	cctatcagct	tggtgggtgg	taatggccta	ccaaggcgac	gacgggtagc	240
cggcctgaga	gggcgaccgg	ccacactggg	actgagacac	ggcccagact	cctacgggag	300
gcagcagtgg	ggaatattgc	acaatgggcg	aaagcctgat	gcagcgacgc	cgctgagggg	360
atgacggcct	tcgggttgta	aacctctttc	agcagggaag	aagcgaaagt	gacgggtacct	420
gcagaagaag	cgccggctaa	ctacgtgcca	gcagccgcgg	taatacgtag	ggcgcaagcg	480
ttgtccggaa	ttattgggcg	taaagagctc	gtaggcggct	tgtagcgtcg	gatgtgaaag	540
cccggggctt	aaccccgggg	ctgcattcga	tacgggctag	ctagagtgtg	gtaggggaga	600
tcggaattcc	tggtgtagcg	gtgaaatgcg	cagatatnca	ggaggaacac	cggtggcgaa	660

ggcggatctc tggccattac tgacgctgag gagcgaaagc gtggggagcg aacaggatta	720
gataccctgg tagtccacgc cgtaaactgtt ggggaactagg tgttggcgac attccacgtc	780
gtcggtgccg cagctgaacg cattaagtcc cccgcctggg gagtacggcc gcaaggctaa	840
aactcaaagg aattgacggg ggcccgcaca agcagcggag catgtggctt aattcgacgc	900
aacgcgaaga accttaccaa ggcttgacat ataccgaaa gcatcagaga tgggtgcccc	960
cttgtggtcg gtatacaggt ggtgcatggc tgtcgtcagc tcgtgtcgtg agatgttggg	1020
ttaagtcccc caacgagcgc aacccttggt ctgtgttgcc agcatgccct tcggggtgat	1080
ggggactcac aggagactgc cggggtcaac tcggaggaag gtggggacga cgtcaagtca	1140
tcatgcccc tttgtcttgg gctgcacacg tgctacaatg gccggtacaa tgagctgcga	1200
tgccgcgagg cggagcgaat ctcaaaaagc cgggtctcagt tcggattggg gtctgcaact	1260
cgaccccatg aagtcggagt tgctagtaat cgcagatcag cattgctgcg gtgaatacgt	1320
tcccgggcct tgtacacacc gccgtcacgt cacgaaagtc ggtaacaccc gaagccggtg	1380
gccaaccgc cttgtgggag ggaactttcc a	1411

<210> 18

<211> 1370

<212> DNA

<213> actinomycete

<220>

<221> misc\_feature

<222> (1)..(1367)

<223> "n" is unknown nucleotide

<400> 18	
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tgggcaattt gcccttcaat ttgggacaag ccctggaaac ggggtntaat accggataac	120
antntgtccc gcatgggacg ggggttaaaag ctccggcggt gaaggatgag cccgcggcct	180
atnagcttgt tgggtggggtg atggcctacc aaggcgacga cgggtagccg gcctgagagg	240
gcgaccggcc aactgggac tgagacacgg cccagactcc tacgggaggc agcagtgggg	300
aatattgcac aatgggcgaa agcctgatgc agcgacgccg cgtgagggat gacggccttc	360
gggttgtaaa cttttttcag cagggaaaga gcgaaagtga cggtagctgc agaagaagcg	420
ccggctaaat angtgccagc agccgcggta atangtaggg cgcaagcggt gtccggaatt	480



attgggcgta aagagtttgt aggcggcttg tcacgtngga tgtgaaagcc cggggcttaa	540
ccccgggttt gcattcgata cgggctagct agagtgtggt aggggagatc ggaattcctg	600
gtgtagcggg gaaatgcgca gatatcagga ggaacaccgg tggcgaaggc ggatctctgg	660
gccattactg acngtgagga gcgaaagcgt ggggagcnaa cagnattaga taccctggta	720
gtccaagccg taaacgttgg gaactangtg ttggcgacat tccacgtcgt cnntgccgca	780
nctaacgcat taagttcccc gcctggggag tacggccgca aggctaanac tcaaaggaat	840
tgangnnggc ccgcacaagc agcggagcat gtggcttant tcnacgcanc gcgaagaacc	900
ttaccaaggt ttgcatata ccggaaagca tcagagatgg tgccccctt gtggtcggta	960
tacaggtggt gcntggctgt cgtcagctcg tgtcgtgaca tgttggttaa gtcccgtcaa	1020
cgaggcgcaa cccttgttnt gtgtngccag catgcccttc ggggtgatgg ggactcacag	1080
gagactgccg ggggtcaactc ggaggaaggt ggggacgacg tcaagtcac atgcccccta	1140
tgtcttgggc tgcacacgtg ctacaatggc cgggtacaatg agctgcgatg ccgcgaggcg	1200
gagcgaatct caaaaagccg gtntcagttc ggattgggggt ctgcaactcg accccatgaa	1260
gtcggagttg ctagtaatcg cagatcagca ttgctgcggt gaatacgttc ccgggccttg	1320
tacacaccgc ccgtcacgtc acgaaagtcg gtaacacccg aagccgntgg	1370

<210> 19

<211> 1162

<212> DNA

<213> actinomycete

<220>

<221> misc\_feature

<222> (1)..(1156)

<223> "n" is unknown nucleotide

<400> 19

gaacgatgaa gccgtttcgg tgggtggatta gtggcgaacg gtgagtaaaa gtggcaattt	60
ncccttcatt ttggacaagc cctggaaacg ggtttaanac cggataacat tntgtcccg	120
atgggacggg gttgaaagnt cccggcgggtg aaggatgagc ccgcggcnta tcagcttggt	180
gggtggggtaa tggcctacca aggcgacgac gggtagccgg cctgagaggg cgaccggcca	240
cactgggant gagacacggc ccagactcct acgggaggca gcagtgggga atattgcaca	300
atgggcgaaa gcctgatgca gcgacgccgc gtgagggatg acggccttcg gggtgtaa	360

ctntttcagc agggaagaag cgaaagtgc ggtacctgca gaagaagcgc cggctaaata	420
ngtgccagca gccgcggtaa tangtagggc gcaagcggtg tccggaatta ttgggcgtaa	480
agagcttgta ggcggcttgt cangtcggat gtgaaagccc ggggcttaac cccgggtttg	540
cattcgatac gggctagtta gagtggtgta ggggagatng gaattcctgg tgtagcggg	600
aaatgcgcag atatcaggag gaacaccggt ggcgaaggcg gatctctggg ccattactga	660
cgctgaggag cgaaagcgtg gggagcnaac aggattagat accctggtag tccacgccgt	720
aaacgttggtg aactaggtgt tggcgacatt ccacgtcgtc ggtgccgcag ctaacgcatt	780
aagttccccg cctggggagt acggccgcaa ggctaaaact caaaggaatt gacggggggc	840
cgcacaagca gcgagcatg tggcttaatt cgacgcaacg cgaacaacct taccaaggct	900
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catggctgtc gtcagctcgt gtcgtgagat gttgggttan gtcccgaac gagcgcnacc	1020
cttgttctgt gtcgncnagc atgcccttcg nggtgatggg gactcacang agactgncgg	1080
ggtccactcg gaggaagggtg gcgacnacgt canntcatca tgccccctta tgtcttggn	1140
ctggccacgt gcnacnatgg cc	1162

<210> 20

<211> 1411

<212> DNA

<213> actinomycete

<220>

<221> misc\_feature

<222> (1)..(1404)

<223> "n" is unknown nucleotide

<400> 20

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tggcgaacgg gtgagtaaca cgtgggcaat ctgcccttca ctctgggaca agccctggaa	120
acgggggtcta ataccggata acactctgtc ccgcatggga cggggttgaa agctccggcg	180
gtgaaggatg agcccgcggc ctatcagctt gttggtgggg taatggccta ccaaggcgac	240
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cctacgggag gcagcagtg ggaatattgc acaatgggcg aaagcctgat gcagcgacgc	360
cgcgtgaggg atgacggcct tcgggttgta aacctctttc agcaggaag aagcgaaagt	420

gacggtacct gcagaagaag cgccggctaa ctacgtgcca gcagccgcgg taatacgtag	480
ggcgcaagcg ttgtccgga ttattgggcg taaagagctc gtaggcggct tgtcacgtcg	540
gatgtgaaag cccggggctt aaccccggt ctgcattcga tacgggctag ctagagtgtg	600
gtaggggaga tcggaattcc tgggtgtagcg gtgaaatgcg cagatatcag gaggaacacc	660
ggtggggaag gcggatctct gggccattac tgacgctgag gagcgaaagc gtggggagcg	720
aacaggatta gataccctgg tagtccaagc cgtaaactgt gggaaactang tgttggcgac	780
attccacgtc gtcggtgccg cagctaacgc attaatgtcc ccgtcctggg gagtacggcc	840
gcnaggctaa aactcaaagg aattgacggg ggcccgacac agcagcggag catgtggctt	900
anttcgacgc nacgcgaaga accttnccaa ggctgacata taccggaaag catcacagat	960
ggtgcccccc ttgtggtcgg tatacagggg ggtgcatggc tgttcgtcag ctcgtgtcgt	1020
gagatgttgg gttaagtccc gcaaagagcg caaccgtgtt ctgtgttgcc agcatgccct	1080
tcggggtgat ggggactcac acgagactgt cnggggtcaac tcggaggaag gtggggacga	1140
cgtcaagtcc atcatgcccc ttatgtcttg ggctgcacac gngctacaat ggccggtaca	1200
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gtgaatacgt ncccgggcct ngtaacacacc acccgctcacg tcacgaaagt cggtaacacc	1380
ctaagccggt gncccaaccc cttntgggag g	1411

<210> 21

<211> 549

<212> DNA

<213> actinomycete

<220>

<221> misc\_feature

<222> (1)..(431)

<223> "n" is unknown nucleotide

<400> 21

ccaganatcc gccttcgcca ccggtgttcc tcctgatata tgcgcatttc accgctacac	60
caggaattcc gatctcccct accacactct agctagcccc tatcgaatgc agacccgggg	120
ttaagccccg ggctttcaca tccgacgtga caagccgcct acgagctctt tacgccaat	180
aattccggac aacgcttgcg ccctacgtat taccgcggt gctggcacgt agttagccgg	240

cgcttcttct gcaggtaccg tcactttcgc ttcttccctg ctgaaagagg tttacaaccc	300
gaaggncgtc atccctcacg cggcgtcgtc gcatcaggct ttcgcccatt gtgcaatatt	360
ccccactgct gcctcccgtg ggagtctggg ncgtgttcaa tnccagtggg,gggccggtcg	420
ccctctcagg nccggtaccg tcgtcgcctt ggtaggcatt accacaacaa gctgataggc	480
gggggtcatc cttcaacgcc ggagcttcaa acccggtccat gcgggacaag tgtatccggt	540
attaaaccc	549

<210> 22

<211> 672

<212> DNA

<213> actinomycete

<220>

<221> misc\_feature

<222> (1)..(643)

<223> "n" is unknown nucleotide

<400> 22	
tcagtnatgg cccagaanga tccgncttcg ccaccggtgt tcctcctgat atctgcgcat	60
ttcaccgcta caccaggaat tccgatctcc cctaccacac tctaactagc ccgtatcgaa	120
tgcagacccg gggttaagcc ccgggctttc acatccgacg tgacaagccg cctacgagct	180
cttnacgccc aataattccg gacaacgctt gcgccttacg tattaccgcg gctgctggca	240
cgtagttagc cggcgcttct tctgcaggta ccgtnacttt cgcttcttcc ctgctgaaag	300
aggtttaciaa cccgaaggcc gtcttccctc acgcggcgtc gctgcatcag gctttcgccc	360
atngtgcant attccccact gntgntctcc gtangagtct gggccgtgtc tcagtcccag	420
tgtggccggt cgnctcttca ggccggctac cgtcgtcgcc ttggtaggnc attaccacc	480
aacaagctga tangtcngg gctcatcctt caccgncgga gntttaaccc cgtncatgcg	540
ggacagagtg ttatccggtg ttanaccgt atncagggtc tgtcccatag tgaagggnag	600
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ttgcatgtgt ta	672

<210> 23

<211> 678

<212> DNA  
<213> actinomycete

<220>  
<221> misc\_feature  
<222> (1)..(648)  
<223> "n" is unknown nucleotide

<400> 23  
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atcgaatgca gacccggggg taagccccgg gctttcacat ccgacgtgac aagccgccta 180  
cgagctcttt acgcccata attccggaca acgcttgccg cctacgtatt accgcggctg 240  
ctggcacgta gtttagccggc gcttcttctg caggtaccgt cactttcgct tcttccctgc 300  
tgaaagaggt ttacaacccg aaggccgtca tccctcacgc ggcgtcgctg catcaggctt 360  
tcgcccattg tgcaatattc cccactgctg cctcccgtag gagtctgggc cgtgtctcag 420  
tcccagtgtg gccggctgcc ctctcaggcc ggctaccctg cgtcgccctg gtaggccatt 480  
accaccaac aagctgatag gccgcgggct catccttcan cgcgcggagct ttaaccgctc 540  
catgcgggac agagtgttat ccggtattaa acccgtttca gggcttgtcc canagtgaag 600  
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tcgacttgca tgtgttaa 678

<210> 24  
<211> 688  
<212> DNA  
<213> actinomycete

<220>  
<221> misc\_feature  
<222> (1)..(666)  
<223> "n" is unknown nucleotide

<400> 24  
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acaccaggaa ttccgatctc ccctaccaca ctctaactag cccgtatcga atgcagaccc	120
ggggttaagc cccgggcttt cacatccgac gtgacaagcc gcctacgagc tctttacgcc	180
caataattcc ggacaacgct tgcgccctac gtattaccgc ggctgctggc acgtaattag	240
ccggcgcttc ttctgcaggt accgtcactt tcgcttcttc cctgctgaaa gaggtttaca	300
acccgaaggc cgtcatccct cacgcggcgt cgctgcatca ggctttcgcc cattgtgcaa	360
tattccccac tgctgntctc cgtangagtc tgggccgtgt ctcagtccca gtgtggccgg	420
tcgncctctc aggccggcta ccgtcgtcgc cttggtaggc cattacccca ccaacaagct	480
gatangccgn gggctcatcc ttcancgtcg gagctttcaa ncccgtccat gcgggacaga	540
gtgttatccg gtattanacc ccgtntcagg gcttgtccan agtgaagggc agatngccac	600
gtgttatcac cgttcgccac taatnacanc gaaacggctt atcgtncgac tgcattgtgtt	660
aacacncgca gcgttcgtcc tgagccag	688

<210> 25

<211> 702

<212> DNA

<213> actinomycete

<220>

<221> misc\_feature

<222> (1)..(658)

<223> "n" is unknown nucleotide

<400> 25

ccctcagggc cagtaatggg cccagagatc cgccttcgcc accggtgttc ctcctgaata	60
tctgcgcatt tcaccgctac accaggaatt ccgatctccc ctaccacact ctagctagcc	120
cgtatcgaat gcagaccgga ggttaagccc cgggctttca catccgacgt gacaagccgc	180
ctacgagctc tttacgcca ataattccgg acaacgcttg cgccctacgt attaccgagg	240
ctgctggcac gtagttagcc ggcgcttctt ctgcaggtag cgtaactttc gcttcttccc	300
tgctgaaaga ggtttacaac ccgaaggccg tcatccctca cgcggcgctc ctgcatcagg	360
ctttcgccca ttgtgcaata ttccccactg ctgcctcccg taggagtctg ggccgtgtct	420
cagtcccagt gtggccgggc gccctctcag gccggctanc cgctcgtcgc ttgggtaggc	480
attanccan caacaagctg ataggncgag ggctcatnct tcaacgccgg agctttcaan	540
cccgtccatg cgggacagag tgttatncgg tattaaaccc gtttcagggc ttgttccaga	600

gtgaagggca gattgccacg tgttatcaac cgttcggcac taatcacaac gaagcggntt	660
atcgttcgac ttgcatgtgt taacaagccg ccagcgttcg tc	702

<210> 26

<211> 711

<212> DNA

<213> actinomycete

<220>

<221> misc\_feature

<222> (1)..(687)

<223> "n" is unknown nucleotide

<400> 26	
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tcaccgctac accaggaatt ccgatctccc ctaccacact ctagctagcc cgtatcgaat	120
gcagacccgg ggttaagccc cgggctttca catccgacgt gacaagccgc ctacgagctc	180
tttacgcca ataattccgg acaacgcttg cgccctacgt attaccgagg ctgctggcac	240
gtagttagcc ggcgcttctt ctgcaggtac cgtcactttc gcttcttccc tgctgaaaga	300
ggttttacaac ccgaaggccg tcatccctca cgcggcgctg ctgcatcagg ctttcgcca	360
ttgtgcaata ttccccactg ctgcctcccg taggagtctg ggccgtgtct cagtcccagt	420
gtggccgggtc gccctctcag gccggctacc cgtcgtcgcc ttggtaggcc attacccac	480
caacaagctg ataggccgag ggctcatcct tcaccgncgg agctttaacc ccgtcccatg	540
cgggacagag tgttatccgg tattagaacc cgtttccagg gcttgccca gagtgaagg	600
cagattgcc cgtgttactc anccgttcgn cactaatcan caacgaagcg gcttcatcgt	660
tcgacttgca tgtgttaagc acgccgncag cgttcgtcct gagccaggat c	711

<210> 27

<211> 522

<212> DNA

<213> actinomycete

<220>

<221> misc\_feature

<222> (1)..(465)

<223> "n" is unknown nucleotide

<400> 27

tcagtatcng	cccagagatc	cgccttcgcc	accggtgttt	cctcctgata	tctgcgcatt	60
tcaccgctac	accaggaatt	ccgatctccc	ctaccgaact	ctagcctgcc	cgtatcgact	120
gcagacccgg	ggttaagccc	cgggctttca	caaccgacgt	gacaagccgc	ctacgagctc	180
tttacgccc	ataattccgg	acaacgcttg	cgccctacgt	attaccgcgg	ctgctggcac	240
gtagttagcc	ggcgcttctt	ctgcaggtac	cgtcactttc	gcttcttccc	tgctgaaaga	300
ggttttacaa	ccgaaggccg	tcatccctca	cgcggcgctc	ctgcatcagg	ctttcgccca	360
ttgtgcaata	ttccccactg	gtgnctcccg	tangagtctg	gggcgtgtct	cantccagtg	420
tgggcggtcg	cctctcaggg	cggctaccgt	cgtcgcttgg	tgagncacta	ctcacaacaa	480
gctgataggc	gcgggctcat	ctggaacggc	ggagctttac	ac		522

<210> 28

<211> 670

<212> DNA

<213> actinomycete

<220>

<221> misc\_feature

<222> (1)..(638)

<223> "n" is unknown nucleotide

<400> 28

tcagtaatgg	cccaganatc	cgncttcgcc	accggtgttc	ctcctgatat	ctgcgcattt	60
caccgctaca	ccaggaattc	cgatctcccc	taccacactc	taactagccc	gtatcgaatg	120
cagacccggg	gttaagcccc	gggctttcac	atccgacgtg	acaagccgcc	tacgagctct	180
ttacgccc	aa taattccgga	caacgcttgc	gccctacgta	ttaccgcggc	tgctggcacg	240
tagttagccg	gcgcttcttc	tgcaggtacc	gtcactttcg	cttcttccct	gctgaaagag	300
gtttacaacc	cgaaggccgt	catccctcac	gcggcgctgc	tgcatcaggc	tttcgccccat	360
tgtgcaatat	tccccactgc	tgctctccgt	angagtctgg	gccgtgtctc	agtcccagtg	420
tggccggtcg	ccctctcagg	ccggctaccg	tcgtcgcctt	ggtaggccat	taccaccaa	480



caagctgata ngncgngggc tcatccttca ccgncggagc tttcaanccc gtcccatgcg	540
ggacagagtg ttatccggtg ttaaaccctg ntccagggtc tgtccatagt gaagggcaga	600
ttgccaagtg ttatcanccg ttcgncacta atcatcancg aagcggcttc atcgttcgac	660
tgcatgtgtt	670

<210> 29

<211> 676

<212> DNA

<213> actinomycete

<220>

<221> misc\_feature

<222> (1)..(666)

<223> "n" is unknown nucleotide

<400> 29	
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tgcgcatctt accgctacac caggaattcc gatctcccct accacactct anctagcccg	120
tatcgaatgc agacccgggg ttaagccccg ggctttcaca tccgangtga caagccgcct	180
acgagctctt tacgccaat aattccggac aangcttgcg ccctacgtat taccgcggnt	240
gctggcacgt agttagccgg cgcttcttct gcagggtaccg tcactttcgc ttcttccctg	300
ctgaaagagg tttaacaacc gaaggccgct atccctcaen cggcgctcgt gcatcaggct	360
ttcgcccatt gtgcaatatt cccactgct gcctcccgta ggagtctggg ccgtgtctca	420
atcccantgt ggccggtcgc cctctcangc cggctaccgt cgctcgttgg taggccatta	480
ccccaccaac aagctggata ggncgggggc tcattcttca ccgccggaag ctttaanccc	540
gtccatgcgg gananagtgn atcccngtat taaaccnngt ttcagggtt gtccanagtg	600
aagggngatt gcccnagtgt ttatnccccg ttcgccanta atcnacaacg aaagcggntt	660
cntcgnttcg acttgc	676

<210> 30

<211> 626

<212> DNA

<213> actinomycete

<220>

<221> misc\_feature

<222> (1)..(618)

<223> "n" is unknown nucleotide

<400> 30

taatggccca gaanatccgc cttcgccacc ggtgttcctc ctgaatatct gcgcatttca	60
ccgctacacc aggaattccg atctccccta ccacactcta gctagcccgt atcgaatgca	120
gacccggggt taagccccgg gctttcacat ccgacgtgac aagccgccta cgagctcttt	180
acgccaata attccggaca acgcttgccg cctacgtatt accgcggctg ctggcacgta	240
gttagccggc gcttcttctg caggtaccgt cactttcgtt tcttccctgc tgaaagaggt	300
ttacaacccg aaggccgtca tccctcacgc ggcgtcgtg catcaggctt tcgcccattg	360
tgcaatatcc cccactgctg cctcccgtag gagtctgggc cgtgtctcag tcccagtggt	420
gcggtcgccc tctcaggccg gntanccgtc gtcgccttgg tangccatta ncccaccaac	480
aagctgatan gccgngggct catccttcan cgccggagct ttttaacccc tcccatgcgg	540
gacagagtgt tatccggtat tagatcccgt ntccagggct tgtncatagt gaagggcana	600
ttgccacgtg ttactcancc gttcgc	626

<210> 31

<211> 20

<212> DNA

<213> primer

<400> 31

agagtttgat cmtggctcag	20
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<210> 32

<211> 21

<212> DNA

<213> primer

<400> 32

ctgtttgctc cccacgcttt c	21
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<210> 33

<211> 22

<212> DNA

<213> primer

<400> 33

tacggytacc ttgttacgac tt

22